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Idaho Operations Office

Action Memorandum for the Non-Time Critical Removal Action at the CPP-603A Basins, Idaho Nuclear Technology and Engineering Center

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Prepared for the
U.S. Department of Energy
DOE Idaho Operations Office

Signature sheet for the Action Memorandum covering the CPP-603A basins at the Idaho Nuclear Technology and Engineering Center at the U.S. Department of Energy's Idaho National Engineering and Environmental Laboratory. This action is conducted by the U.S. Department of Energy, with the concurrence of the U.S. Environmental Protection Agency and the Idaho Department of Environmental Quality.

Richard B. Provencher
Assistant Manager
U.S. Department of Energy Idaho Operations Office

Date 12/6/2004

Signature sheet for the Action Memorandum covering the CPP-603A basins at the Idaho Nuclear Technology and Engineering Center at the U.S. Department of Energy's Idaho National Engineering and Environmental Laboratory. This action is conducted by the U.S. Department of Energy, with the concurrence of the U.S. Environmental Protection Agency and the Idaho Department of Environmental Quality.

Nicholas Ceto
INEEL Program Manager
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12/6-/04
Date

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Daryl F. Koch

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12/06/09

Date

ABSTRACT

This report is the decision document that provides for the non-time critical removal action to perform interim stabilization of the CPP-603A basins, a former nuclear fuel storage facility located at the Idaho National Engineering and Environmental Laboratory. This non-time critical removal action will remove the threat posed by potential release of water and hazardous material currently in the basin. The sludge in the basins will be removed and treated in accordance with the Idaho Hazardous Waste Management Act/Resource Conservation and Recovery Act. This non-time critical removal action includes removing, treating, and disposing of the basin water; removing a highly radioactive object (SHADO 1); and filling the basins with grout. This removal action is consistent with the Comprehensive Environmental Response, Compensation, and Liability Act *Final Record of Decision Idaho Nuclear Technology and Engineering Center, Operable Unit 3-13*, thus supporting the overall remediation goals at Waste Area Group 3.

CONTENTS

FIGURES

TABLES

ACRONYMS

ARAR	applicable or relevant and appropriate requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
CPP	Chemical Processing Plant
DOE	U.S. Department of Energy
DOE-ID	U.S. Department of Energy Idaho Operations Office
EDF	engineering design file
EE/CA	engineering evaluation/cost analysis
EPA	U.S. Environmental Protection Agency
HWMA	Hazardous Waste Management Act
ICDF	INEEL CERCLA Disposal Facility
IDAPA	Idaho Administrative Procedures Act
IFSF	Irradiated Fuel Storage Facility
INEEL	Idaho National Engineering and Environmental Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
OU	operable unit
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
SHADO	small high-activity debris object
TBC	to be considered
USC	*United States Code*
WAG	waste area group

Action Memorandum for the Non-Time Critical Removal Action at the CPP-603A Basins, Idaho Nuclear Technology and Engineering Center

1. STATEMENT OF BASIS AND PURPOSE

This Action Memorandum documents selection of the non-time critical removal action recommended in the *Engineering Evaluation/Cost Analysis for the CPP-603A Basin Non-Time Critical Removal Action, Idaho Nuclear Technology and Engineering Center* (DOE-ID 2004). The regulatory framework outlined in this Action Memorandum has been modified from the description provided in the Engineering Evaluation/Cost Analysis (EE/CA). The modification affects regulation of sludge removal, treatment, and disposal, but the end state and technical approaches have not changed. The EE/CA—conducted pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)—evaluated risks associated with the sludge and alternatives for addressing those risks. A decision has been made to address the sludge under the Hazardous Waste Management Act/Resource Conservation and Recovery Act (HWMA/RCRA).

The CPP-603A nuclear fuel storage basins are located at the Idaho Nuclear Technology and Engineering Center (INTEC) at the U.S. Department of Energy's (DOE's) Idaho National Engineering and Environmental Laboratory (INEEL) in Butte County, Idaho. The CERCLA Operable Unit (OU) 3-13 Record of Decision (ROD)—*Final Record of Decision Idaho Nuclear Technology and Engineering Center, Operable Unit 3-13* (DOE-ID 1999)—governs CERCLA sites within the INTEC facility designated as Waste Area Group (WAG) 3. Therefore, this CERCLA removal action is subject to the remedial action objectives established in the OU 3-13 ROD (DOE-ID 1999).

This Action Memorandum has been developed in accordance with CERCLA (42 USC § 9601 et seq.), as amended by the "Superfund Amendments and Reauthorization Act of 1986 (SARA)" (Public Law 99-499), and in accordance with the "National Oil and Hazardous Substances Pollution Contingency Plan" (40 CFR 300). The decision documented in this Action Memorandum is based on the Administrative Record for the Site.

The recommended action is to perform interim stabilization of the basins. The sludge in the basins will be removed and treated in accordance with HWMA/RCRA. This non-time critical removal action includes removing, treating, and disposing of the basin water; removing a highly radioactive object (SHADO 1); and filling the basins with grout. The basin water will be removed while the basins are filled with grout. Other debris objects contaminated with radioactive cobalt will be consolidated and encapsulated in the grout. The position of these debris objects will be noted for future location and removal, if necessary. The grout will provide shielding for the radioactive contamination embedded in the basin walls, eliminating possible migration and airborne contamination. This Action Memorandum uses the term "debris" to refer to both radioactive and nonradioactive material in the basins. The terms "debris" and "debris objects" are used in the document to refer to 14 discrete, highly radioactive objects sitting on the basin floor as well as a variety of nonradioactive hand tools and general rubbish inadvertently dropped in the basins over the years. The water will be pumped to the INEEL CERCLA Disposal Facility (ICDF) evaporation pond and evaporated. The final decontamination and disposition of the basin structure will be evaluated when the entire CPP-603 Complex is taken out of service. This non-time critical removal action is an interim action that will reduce the risks to human health, the environment, and site workers by minimizing the potential for release of hazardous substances. This interim action does not prejudice the final end-state alternative.

This removal action is consistent with the OU 3-13 ROD (DOE-ID 1999), thus supporting the overall remediation goals at WAG 3. The OU 3-13 ROD requires that, if contaminated soil exists beneath a building, the building must be maintained to prevent moisture infiltration and to prevent exposure to current industrial workers. Once decontamination and decommissioning of the building have been completed, and if contaminated soil exists under the footprint of the former building, the soil that exceeds the WAG 3 soil remediation goals must be either excavated or capped with an engineered barrier.

2. BACKGROUND AND FACILITY DESCRIPTION

2.1 Background

The INTEC, located in the south-central area of the INEEL (Figures 1 and 2), began operations in 1952. Historically, spent nuclear fuel from defense projects was reprocessed to separate reusable uranium from spent nuclear fuel. In 1992, the U.S. Department of Energy Idaho Operations Office (DOE-ID) discontinued reprocessing. The current mission for INTEC is to receive and temporarily store spent nuclear fuel and radioactive waste for future disposition, manage waste, and perform remedial actions.

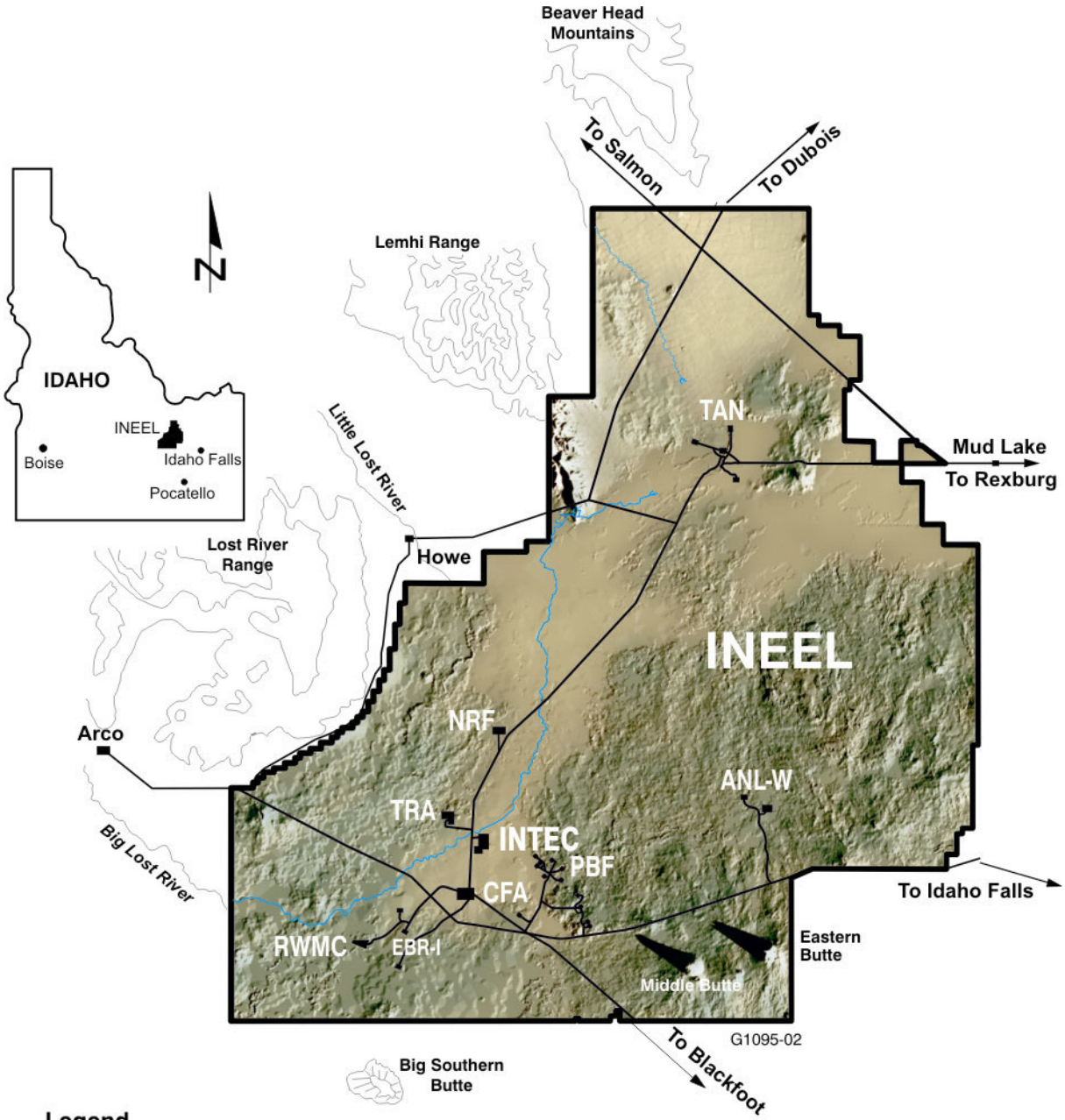
Pending reprocessing, spent nuclear fuel was stored underwater in basins, including CPP-603A (Figure 2). By the year 2000, all inventoried spent nuclear fuel was removed from the facility's underwater storage basins and placed in newer underwater or dry storage facilities on the INEEL. The inactive water treatment system used to maintain the quality of the CPP-603 basin water will be closed separately under the INEEL Voluntary Consent Order in accordance with the requirements of HWMA/RCRA. The CPP-603A basins are no longer needed for fuel storage; however, they are still in use to provide shielding and must either be maintained so the basins do not present a threat to public or worker health and safety or they must be isolated from the environment. The DOE-ID needs to eliminate the risk and costs associated with maintaining this facility and its associated processes, because both environmental risk and cost risk will increase as the facility ages. Therefore, DOE-ID is initiating this non-time critical removal action to reduce or eliminate the risks associated with maintaining this facility. This action does not prejudice the final end-state alternatives.

2.2 Facility Description

The DOE-ID began construction of CPP-603 in the early 1950s, and the underwater storage basins began operation in 1952. The basins have been used to store spent nuclear fuel from the time they were placed in service and will become inactive though issuance of the Action Memorandum for this removal action. The facility was constructed to seismic criteria, construction codes, and safety requirements of the early 1950s. In addition, the basins (which were constructed of reinforced concrete) have no secondary liners. Currently, the basins are maintained full of water to minimize exposure to the radionuclides in the basins' sludge and debris as well as to radioactive contamination affixed to the basin walls.

The storage basins are reinforced concrete structures with most of their volume below grade. Each of the three basins and the transfer canal are filled with water. The combined volume of water in the storage basins and transfer canal is approximately 5.30E+06 L (1.40E+06 gal).

The north and middle basins are 18 m (60 ft) long, 12 m (40 ft) wide, and 6.5 m (21 ft) deep. Each of the basins is 1.28E+03 m^3 (1.67E+03 yd^3) in volume. The basins and transfer canal are covered with fiberglass grating and a radiation shield consisting of lead plate sandwiched between aluminum plates. The shielding is present primarily for activity associated with accumulation of a residue ring on the basins and transfer canals' walls at the surface of the water. Concrete beams, 0.6 m (2 ft) high and 0.3 m (1 ft)



Legend

ANL-W	=	Argonne National Laboratory-West
CFA	=	Central Facilities Area
EBR-I	=	Experimental Breeder Reactor I
INEEL	=	Idaho National Engineering and Environmental Laboratory
INTEC	=	Idaho Nuclear Technology and Engineering Center
NRF	=	Naval Reactors Facility
PBF	=	Power Burst Facility
RWMC	=	Radioactive Waste Management Complex
TAN	=	Test Area North
TRA	=	Test Reactor Area

Figure 1. Location of the Idaho Nuclear Technology and Engineering Center on the Idaho National Engineering and Environmental Laboratory Site.

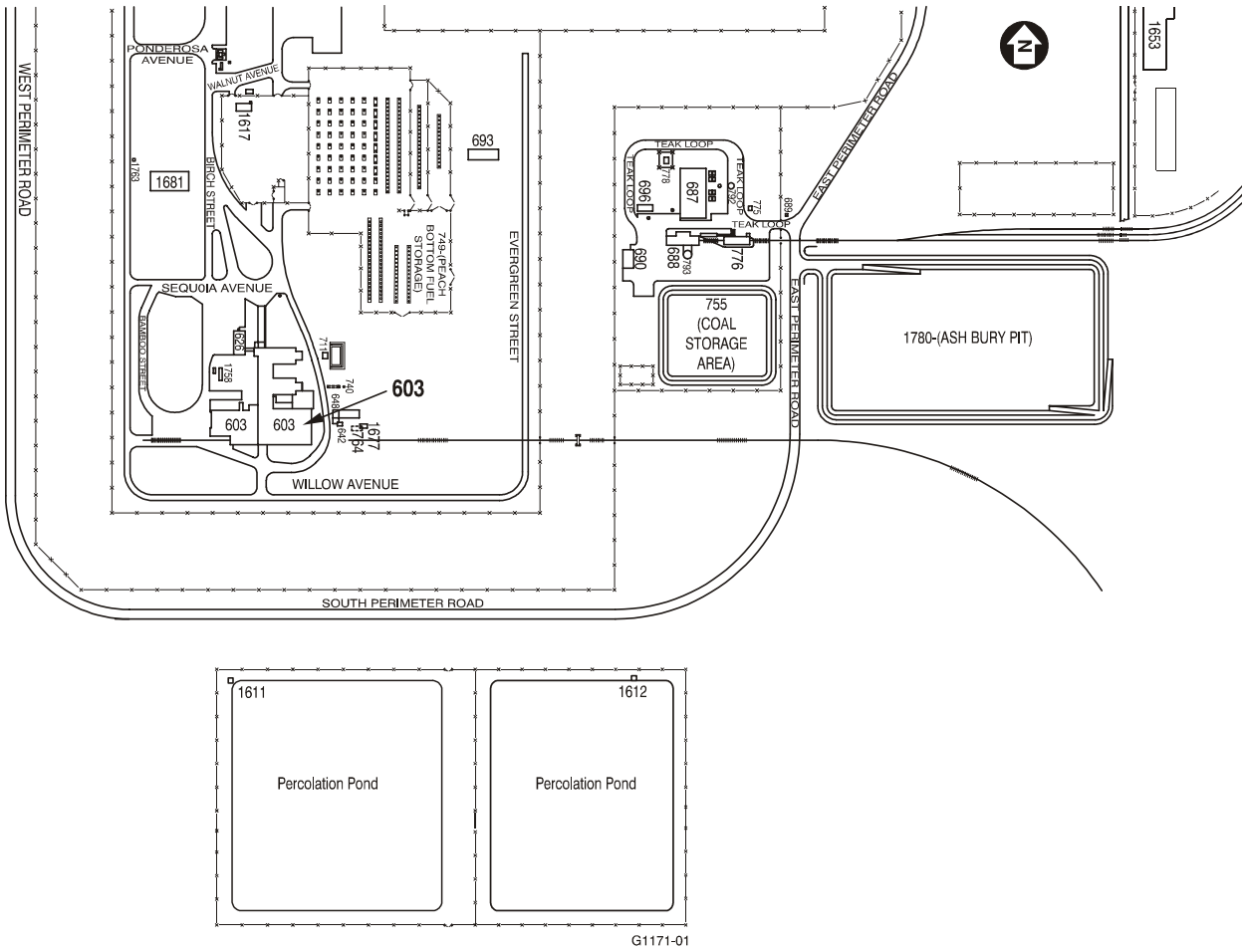


Figure 2. Plan view of the southern portion of the Idaho Nuclear Technology and Engineering Center.

wide on 0.6-m (2-ft) centers, support the grating and radiation shield. Similar concrete dividers are located on the bottom of the basins. The beams, concrete dividers, and other fixtures were designed to sustain the spent nuclear fuel in a safe configuration.

Spent nuclear fuel stored in the north and middle basins was suspended under water from monorails located approximately 3 m (8 ft) above the basin walls. Small, 4-cm (1.5-in.) -wide continuous slots in the grating under the track allowed the fuel to move to its storage location. The south basin is an open basin, 14 m (45 ft) × 24 m (80 ft) in area and 6.5 m (21 ft) deep. The total volume of the south basin is 2.18 E+03 m^3 (2.80 E+03 yd^3). Fuel was placed in the south basin in aluminum or stainless-steel racks. The racks were accessed using a catwalk crane located above the basin. The racks have been removed from the basins. The south basin contains three storage boxes. The 1 × 1 × 1.2-m (3 × 3 × 4-ft) open-top carbon steel boxes contain miscellaneous basin debris objects.

A 2.5 × 650 × 6.5-m (8 × 200 × 21-ft) transfer canal connects the three storage basins. A floor grating overlaid with lead-plate shielding covers the transfer canal. The monorail track extends overhead on both sides of the transfer canal. In addition, continuous slots are located in the transfer canal grating to facilitate movement of the fuel to the assigned storage basin.

The floors of the storage basins are covered with a layer of sediment. The sediment (which is referred to in this document as sludge) consists of desert sand, dust, precipitated corrosion products, and residuals from past fuel-cutting operations.

This non-time critical removal action, which is an interim action, applies to the CPP-603A basins, including the Fuel Element Cutting Facility, the overflow pit, and the transfer channel. Deactivation, decontamination, and decommissioning of the other currently unused portions of CPP-603A will be coordinated with the final deactivation, decontamination, and decommissioning of the CPP-603 Complex. The CPP-603B (Irradiated Fuel Storage Facility) is expected to remain active until approximately 2035. Currently, the basin water treatment system is being closed under the Voluntary Consent Order to the requirements of HWMA/RCRA. Preparation to close the VES-SFE-106 waste tank system in accordance with HWMA/RCRA requirements also is underway.

2.3 Previous and Current Actions

In 1978, a cleanup project was undertaken to remove sludge from the CPP-603A basins. Concentrated sludge was pumped to the VES-SFE-106 tank and then to concrete, steel-lined tanks. The sludge was later solidified and disposed of at the Radioactive Waste Management Complex as low-level radioactive waste.

In 2000, all inventoried spent nuclear fuel was removed from underwater storage in the CPP-603A basins. The Peach Bottom fuel, which was stored above water in a dry hot cell, was removed from the Fuel Element Cutting Facility in April 2004. The aluminum and stainless-steel racks that supported the spent nuclear fuel also were removed from the basins. Currently, the basins are kept full of water to provide shielding for a spent nuclear fuel-like item (e.g., Small High-Activity Debris Object 1 [SHADO 1]), other high-activity objects, items containing fissile material (e.g., sludge), and activated metals—all with significant radioactivity—as well as radioactive contamination adhering to and/or embedded in the interior basin surfaces.

In August 2004, the public was informed that an EE/CA (DOE-ID 2004) was available in the Administrative Record. The EE/CA was released for public comment on August 2, 2004. In addition, presentations were made to the INEEL Citizens' Advisory Board and special interest groups. A formal public meeting was held in Idaho Falls, Idaho, on August 19, 2004, to provide an overview of the non-time critical removal action and answer questions from the public. Appendix A contains the public comments received on the EE/CA and the written responses.

3. THREAT TO PUBLIC HEALTH, WELFARE, AND/OR THE ENVIRONMENT

The "National Oil and Hazardous Substances Pollution Contingency Plan" (40 CFR 300.415[b]) identifies factors that must be considered in determining whether a threat to public health or welfare or the environment exists. The factors applicable to the CPP-603A basins are:

- Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances, pollutants, or contaminants (40 CFR 300.415 [b][2][i])

- Actual or potential contamination of drinking water supplies or sensitive ecosystems (40 CFR 300.415 [b][2][ii]).

The contaminants of concern that this removal action and coordinated actions are addressing are RCRA and CERCLA hazardous substances, pollutants, or contaminants. Over time, approximately 41,512 L (1,467 ft^3) of sludge, with an estimated mass of 49,300 kg (109,000 lb), has accumulated on the bottom of the basins. The average depth of sludge on the basins' floors is 3.66 cm (1.4 in.) (EDF-4235). The sludge is comprised of desert sand, dust, precipitated corrosion products, and residuals from past fuel rod cutting operations. Sampling results of the sludge identified leachable cadmium at concentrations ranging from 1.69 to 8.34 mg/kg, which exceeds the HWMA/RCRA regulatory level of 1.00 mg/kg.

In addition, numerous pieces of metal are located in the basins, including a debris object designated SHADO 1, which measures 90 R/hr at contact (EDF-4271) based on 2003 and 2004 scanning. Other debris objects measure up to 300 R/hr because of activation products. The primary contaminant is cobalt-60. Cobalt-60 decays rapidly, with a half-life of 5.27 years. The total amount of cobalt-60 in all debris objects will decay to approximately 19.5 Ci by 2035, when operations in the CPP-603 Complex are expected to end. If the end state selected for the CPP-603 Complex includes removal of the other debris objects, the calculated additional worker exposure from the cobalt-60—when compared to the exposure from radionuclides embedded in the basin walls—is essentially zero. Other items such as fuel buckets, various tools, and disposal containers also are in the basins. These objects are not radioactive but are coated with basin sludge that is radioactive. The objects will remain in the basin after the sludge is removed.

The scum line is a concentration of contamination at the interface of the water and the basin walls, rather like the soap scum line in a bathtub. Contamination has penetrated the basins' porous cement walls and has been measured as high as 150-mR/hr beta-gamma. The basin water currently shields the high activity.

Continued surveillance and maintenance activities expose workers to hazards associated with the contaminants in the CPP-603A basins and, over time, pose cumulative risk to workers. Without the existing operational controls, workers could be directly exposed to contaminants through skin contact, ingestion, or inhalation. Radionuclides are known carcinogens, and the non-radioactive contaminants present the potential carcinogenic and non-carcinogenic risks. The risk posed by the interim stabilization and potential risk posed to future workers is substantially less than the risks posed by continued surveillance and maintenance activities as the basins deteriorate.

Potential release of water and contaminants to the subsurface poses a substantial risk to the Snake River Plain Aquifer. As the basins continue to age, the threat of a potential release of water to the subsurface increases. The underlying Snake River Plain Aquifer is the sole source of drinking water for many citizens of Idaho.

4. ENDANGERMENT DETERMINATION

The response action selected by this Action Memorandum is necessary to protect public health, welfare, or the environment from actual releases or a substantial threat of releases of hazardous substances into the environment.

This section provides information regarding the proposed action and alternatives considered.

4.1 Proposed Action

The following proposed action is consistent with Alternative 3, as described in the EE/CA (DOE-ID 2004). The sludge in the basins will be removed and treated in accordance with HWMA/RCRA.

This non-time critical removal action includes removing, treating, and disposing of the basin water; removing a highly radioactive object (SHADO 1); and filling the basins with grout. Basin water will be removed while the basins are filled with grout. The water will be pumped to the ICDF evaporation pond and evaporated. The grout pumped into the basin will be a controlled, low-strength material type of grout specifically formulated to have a low compressive strength, to be self-leveling, not to settle after hydration, to be nonhazardous, and to be capable of being excavated in the future with conventional digging equipment. The highly contaminated scum ring on the basin will not be exposed during water removal and grout pumping operations. The SHADO 1, a small high-activity debris object, will be removed and managed in a facility designed to manage the high levels of radiation. Debris objects contaminated with radioactive cobalt will be consolidated and encapsulated in the grout. The radioactive cobalt in the encapsulated debris will decay to levels comparable to the 200-mR/hr environment expected in the basins when the CPP-603 fuel operations are complete. The position of the debris objects will be noted for future removal, if necessary. The grout will provide shielding for the radioactive contamination embedded in the basin walls, eliminating possible migration and airborne contamination. The final decontamination and disposition of the basin structure will be evaluated when the entire CPP-603 Complex is taken out of service. Before completion of the removal action, DOE-ID will conduct soil sampling and analysis around the failed drain line (3 1/2" PLA-100115) as committed to in the *HWMA/RCRA Less Than 90-day Generator Closure Report for the VES-SFE-126* (INEEL 2000). When the water is removed from the basins and the threat to the integrity of the basin is mitigated, a characterization plan specifying methods for determining the nature and extent of contamination will be developed and implemented as a separate action.

The DOE-ID compared the alternatives described in Section 5.2 and prefers Alternative 3, because it complies with regulations and is cost effective. In addition, this action was selected because:

- Removal of the water from the basins is the most effective action to eliminate the threat of a release to the environment.

- This removal action is consistent with the OU 3-13 ROD (DOE-ID 1999). As such, it supports the overall remediation at WAG 3.

- Placing grout in the basins implements DOE-ID's management policy for controlling worker radiation exposure to levels as low as reasonably achievable by minimizing exposure to the highly contaminated scum line on the basin walls and encapsulating the non-uranium-235 containing debris and rubbish on the bottom of the basins.

- This removal action is an interim action and does not prejudice the future end-state alternative.

Activities will be performed using currently accepted practices and standard operating procedures listed in the project health and safety plan.

4.1.1 Removal Action Objectives and Contribution to Remedial Performance

These removal action goals are consistent with the remedial action objectives established in the OU 3-13 ROD (DOE-ID 1999). As such, the removal action will be consistent with and will contribute to the overall remediation of INTEC under CERCLA (42 USC § 9601 et seq.).

The removal action objectives for this non-time critical removal action are as follows:

- Reduce the risk to the Snake River Plain Aquifer by removing the basin water. This water, if released, could serve as a driving force for moving existing vadose zone contaminants to the aquifer.

- Provide a mechanism for the permanent safe disposition of radioactive water currently in the CPP-603A basins while safely stabilizing the cobalt-60 contaminated objects as well as the non-uranium containing debris and rubbish until an end state for the CPP-603 Complex is identified.

- Minimize the risk posed by contaminants remaining at the CPP-603A basins after the removal action so it does not exceed a cumulative carcinogenic risk level of 1×10^{-4} and a total hazard index of one for future residents in 2095 and for current workers.

- Prevent migration of contaminants from the CPP-603A basins at levels that could cause the Snake River Plain Aquifer groundwater (located outside the INTEC security fence) to exceed a cumulative carcinogenic risk level of 1×10^{-4}, a total hazard index of one, or applicable State of Idaho groundwater quality standards in 2095 and beyond.

The removal action goals are predicated on the current and future land uses established for INTEC in the OU 3-13 ROD (DOE-ID 1999), which includes industrial land use until at least 2095. The groundwater ingestion exposure pathway is assumed to be the only viable exposure pathway. A surface exposure pathway does not exist from CPP-603A, since the debris is present 20 ft below ground, the water will be removed, and the basins will be filled with an inert material. This is consistent with the OU 3-13 ROD (DOE-ID 1999), where surface pathway risks are assumed to occur for contamination from ground surface to 10 ft below ground surface.

4.2 Engineering Evaluation/Cost Analysis

The EE/CA (DOE-ID 2004) is contained in the Administrative Record. The EE/CA evaluated six alternatives ranging from no action (continued surveillance and maintenance) to water, sludge, debris, and basin floor and wall removal and disposal.

4.2.1 Alternative 1—No Action (Continued Surveillance and Maintenance)

The no action alternative provides a baseline against which impacts of the other alternatives can be compared. Under the no action alternative, no removal action would be taken at CPP-603, but the current surveillance and maintenance activities would continue. The basins and their contents would remain as they currently are until deactivation, decontamination, and decommissioning of the CPP-603 Complex are implemented at a later date.

This comparatively inexpensive alternative is easily implemented, incurring only costs associated with surveillance and maintenance. However, the no action alternative offers no reduction in toxicity, mobility, or volume of contaminants. When the use of the basins for the shielding of highly radioactive material is no longer needed, it would be inappropriate to continue management of the water, sludge, and debris in the basins. This alternative would not meet the removal action objective of removing the basin water to reduce the risk to the Snake River Plain Aquifer. For these reasons, the no action alternative was rejected. The longer action is delayed, the higher the cleanup cost will be. Finally, this alternative would simply delay the final action for the CPP-603A basins, increasing the length of time over which the threat of release is not addressed.

4.2.2 Alternative 2—Removal and Disposal of Water with Sludge and Debris Grouted in Place

In Alternative 2, the sludge and debris in the basins and canals would be left in place and would be bound up in the initial grout pours. An exception is that the SHADO 1 would be removed and managed in a facility designed to manage the object.

The basin water would be removed and treated at the ICDF evaporation ponds. As the water is removed, the basins would be filled with grout. The grout would be pumped onto the basin floors to maintain a constant water level. This would reduce the chance of spreading contamination associated with the scum ring on the basin walls by keeping the residue under water. The grout would replace the water that is currently serving to shield the highly radioactive material remaining in the basins. The highly contaminated scum ring on the basin would not be exposed during water removal and grout pumping operations.

This alternative is not as effective as Alternatives 3, 4, 5, or 6, since it does not remove the contaminants from the sludge. Characterization of the sludge found high concentrations of cadmium as well as radionuclides.

4.2.3 Alternative 3—Removal and Disposal of Water and Sludge with Debris Grouted in Place

Alternative 3 would include the removal of water and sludge from the basins and grouting the basin debris in place. The SHADO 1 would be removed and managed in a facility designed to manage the object.

The sludge in the basins will be removed and treated in accordance with the HWMA/ RCRA. This non-time critical removal action includes removing, treating, and disposing of the basin water; removing a highly radioactive object (SHADO 1); and filling the basins with grout. The basin water would be removed while the basins are filled with grout. The basin water would be disposed of at the ICDF evaporation ponds. As the water is removed, grout would be pumped onto the basin floors to maintain a constant water level. The highly contaminated scum line on the basin walls would not be exposed during water removal and grout pumping operations. The grout would encapsulate the non-uranium-235 containing debris and rubbish. After treatment, the sludge will be disposed of in an appropriate landfill that can accept radioactive waste.

4.2.4 Alternative 4—Removal and Disposal of Water, Sludge, and Debris with Basins Grouted in Place

Alternative 4 is similar to Alternative 3 with the additional removal of the debris objects in the basins. Removal of the debris objects does not alter the end state of the CPP-603 Complex. Alternative 4 reduces the potential risk to the aquifer, satisfies the remedial action objectives of the OU 3-13 ROD (DOE-ID 1999), and complies with regulations. Alternative 4 does not, however, protect workers taking the action to the extent of the preferred alternative. Alternative 4 was rejected, because it provides less worker protection.

4.2.5 Alternative 5—Water, Sludge, and Debris Removal and Disposal with Basin Interior Cleaning, Followed by Fixative and Shielding Installation

Alternative 5 is similar to Alternative 3 with the additional removal of the debris objects and cleaning of the basins' walls. A containment barrier would be constructed over the basins to contain airborne contamination during basin contents removal and follow-on activities. Scrubbing, scabbling, or other methods would physically remove contamination from the concrete basin walls and floors. A fixative would be applied to the basin interiors if contamination remains that cannot be removed through decontamination efforts. Ongoing maintenance of the fixative would be required. If necessary, lead shielding would be installed to provide additional protection from the contaminants remaining in the basin interior. Contaminated waste generated during decontamination efforts would be stabilized and disposed of at the ICDF or other acceptable facility. After decontamination, the basins would be covered to prevent unintended access. Alternative 5 was rejected, because it is more costly and presents greater worker risk.

4.2.6 Alternative 6—Water, Sludge, Debris, and Basin Floor and Wall Removal and Disposal

Alternative 6 would involve the removal and disposal of the entire basin structure. A containment barrier would be constructed over the basins to contain airborne contamination during basin contents removal and follow-on activities. Scrubbing, scabbling, or other methods would physically remove contamination on the concrete basin walls and floors. A fixative would be applied to the basin interiors, if contamination remains that cannot be removed through decontamination efforts. After application of the fixative, the concrete basins would be removed and disposed of at the ICDF, Radioactive Waste Management Complex, or other acceptable facility.

The removal of the concrete basins is not possible at this time, because the basin walls are adjacent to an integral structural element of the Irradiated Fuel Storage Facility (IFSF). Until the IFSF operations cease, Alternative 6 cannot be implemented. Alternative 6 was rejected, because the IFSF is expected to continue operations until about 2035.

4.3 Compliance with Environmental Regulations, Including those that are Applicable or Relevant and Appropriate Requirements

The selected removal action alternative (Alternative 3) will comply with environmental regulations, including those that are applicable or relevant and appropriate requirements (ARARs). Currently, the basins are kept full of water to provide shielding for a spent nuclear fuel-like item (a small high-activity debris object designated SHADO 1 [EDF-4271]); other items containing fission material; basin sludge, which contains activated metals; and radioactive contamination adhering to and/or embedded in the interior basin surfaces. Characterization of the basin sludge showed it contains high levels of cadmium (greater than 1 mg/kg). The sludge in the basins will be removed and treated in accordance with HWMA/RCRA. This non-time critical removal action includes removing basin water, treating and disposing of the basin water, removing a highly radioactive object (SHADO 1), and filling the basins with grout.

Table 1 lists the CERCLA ARARs that have been identified for the proposed action. These ARARs are a compilation and expansion of the ARARs identified in the OU 3-13 ROD (DOE-ID 1999). The ARARs list is based on several key assumptions:

- Management of CERCLA waste will meet the waste acceptance criteria of the receiving facility, whether that facility is an on-INEEL facility (such as the ICDF, Radioactive Waste Management Complex, or INEEL Landfill Complex at the Central Facilities Area) or an off-INEEL facility. The ICDF is the preferred location for disposal of contaminated CERCLA waste from WAG 3.

- Currently, the basins are kept full of water to provide shielding for spent nuclear fuel-like items (e.g., SHADO 1), other high-activity objects, items containing fissile material (e.g., sludge), and activated metals—all with significant radioactivity—as well as radioactive contamination adhering to and/or embedded in the interior basin surfaces.

- The water to be removed from the basins is expected to not have the characteristics of a hazardous waste. It is not expected to require management to meet ARARs. However, water characterization will be necessary to confirm that the water meets the waste acceptance criteria of the ICDF evaporation ponds prior to disposal.

- The CERCLA waste that may be generated during implementation of the removal action will be handled in accordance with the ARARs identified in Table 1.

- For waste disposal at a location other than the ICDF, the U.S. Environmental Protection Agency (EPA) regional office with oversight over the permitted receiving disposal facility will be contacted to verify that the facility has been determined suitable for receiving CERCLA waste shipped off-Site (40 CFR 300.440).

Table 1. Summary of applicable or relevant and appropriate requirements for the proposed removal action.

Requirement (Citation)	ARAR Type	Comments
Clean Air Act and Idaho Air Regulations		
"Toxic Substances," IDAPA 58.01.01.161	A	Applies to the water and debris removal and grouting activities.
"National Emission Standards for Hazardous Air Pollutants," <10 mrem/yr 40 CFR 61.92, "Standard"	A	Applies to the water and debris removal and grouting activities.
"National Emission Standards for Hazardous Air Pollutants," 40 CFR 61.93, "Emission Monitoring and Test Procedures"	A	Applies to the water and debris removal and grouting activities.
"National Emission Standards for Hazardous Air Pollutants," 40 CFR 61.94(a), "Compliance and Reporting"	A	Applies to the water and debris removal and grouting activities.
"National Emission Standards for Hazardous Air Pollutants," 40 CFR 61.145, "Standards for Demolition and Renovation"	A	Applies to the water and debris removal and grouting activities.
"National Emission Standards for Hazardous Air Pollutants," 40 CFR 61.154, "Standard for Active Waste Disposal Sites"	A	Applies to the water and debris removal and grouting activities.

Table 1. (continued).

Requirement (Citation)	ARAR Type	Comments
"Toxic Air Pollutants Non-carcinogenic Increments," IDAPA 58.01.01.585	A	Applies to the water and debris removal and grouting activities.
"Toxic Air Pollutants Carcinogenic Increments," IDAPA 58.01.01.586	A	Applies to the water and debris removal and grouting activities.
"Rules for Control of Fugitive Dust," and "General Rules," IDAPA 58.01.01.650 and .651	A	Applies to the water and debris removal and grouting activities.
RCRA and Idaho Hazardous Waste Management Act		
Generator Standards:		
"Standards Applicable to Generators of Hazardous Waste," IDAPA 58.01.05.006, and the following, as cited by reference:		
"Hazardous Waste Determination," 40 CFR 262.11	A	Applies to waste that will be generated during the removal action.
Land Disposal Restrictions:		
IDAPA 58.01.05.011, "Land Disposal Restrictions," and the following, as cited by reference:		
"Applicability of Treatment Standards," 40 CFR 268.40(a)(b)(e)	A	Applies to waste generated if treatment is necessary to meet the disposal facility's waste acceptance criteria.
Idaho Groundwater Quality Rules		
"Idaho Groundwater Quality Rule," IDAPA 58.01.11	A	The final configuration of the CPP-603A Basin Facility must prevent migration of contaminants from basins that would cause the Snake River Plain Aquifer groundwater to exceed applicable State of Idaho groundwater quality standards in 2095 and beyond.
"National Historic Preservation Act"		
Section 106 as amended (16 USC § 470 et seq.)	A	Requires agencies to consider the impact of undertakings on properties listed or eligible for listing in the National Register of Historic Places and to consult with the Idaho State Historic Preservation Office and other interested parties when impacts are likely.
"Archaeological Resources Protection Act of 1979" (16 USC § 470aa–470mm), as amended	A	Provides for the protection and management of archaeological resources on federal lands.
United States Fish and Wildlife Service		
Guidance for threatened and endangered plant and animal species list	TBC	If, after reviewing the list, DOE-ID determines that the proposed actions would not impact threatened and endangered species, DOE-ID may determine or document that formal consultation with the United States Fish and Wildlife Service is not required for this action. The DOE-ID has determined that a biological assessment would not be required for the alternatives considered.

Table 1. (continued).

Requirement (Citation)	ARAR Type	Comments
To-Be-Considered Requirements		
"Radiation Protection of the Public and the Environment," DOE Order 5400.5, Chapter II (1)(a, b)	TBC	Applies to the CPP-603A basins before, during, and after the removal action. Substantive design and construction requirements will be met to keep public exposures as low as reasonably achievable.
"Radioactive Waste Management," DOE Order 435.1	TBC	Applies to the CPP-603A basins before, during, and after the removal action. Substantive design and construction requirements will be met to protect workers.
"EPA Region 10 Final Policy on Institutional Controls at Federal Facilities" (EPA 1999)	TBC	Applies if contamination is left in place at concentrations that preclude unrestricted access after completion of the removal action.

A = applicable requirement; R = relevant and appropriate requirement; TBC = to be considered
ARAR = applicable or relevant and appropriate requirement
CFR = *Code of Federal Regulations*
CPP = Chemical Processing Plant
DOE = U.S. Department of Energy
EPA = U.S. Environmental Protection Agency
IDAPA = Idaho Administrative Procedures Act
RCRA = Resource Conservation and Recovery Act

5. PROJECT SCHEDULE

This removal action is expected to begin onsite activities in Fiscal Year 2005 with anticipated completion by October 2005. This removal action will proceed through the period of the change of DOE-ID INEEL Cleanup Contract contractor. The DOE-ID will prepare a Removal Action Work Plan and submit it to the EPA and Idaho Department of Environmental Quality in December 2004. The Final Removal Action Report is anticipated to be completed by November 2005 and will be submitted to the EPA and Idaho Department of Environmental Quality for review. A high-level schedule for the removal action is provided in Table 2.

Table 2. High-level schedule for the removal action.

Activities	Completion Date
Remove and manage SHADO 1	3/31/05
Remove basin water and place grout	9/30/05
Project close-out and Removal Action Report	10/30/05

SHADO = small high-activity debris object

6. ESTIMATED COST

The estimated cost of the recommended removal action is approximately $2.2 million and is shown in Table 3. The costs represented are in net present value terms and an escalation factor has not been applied. The cost estimate is based on the cost of performing the work in the current calendar year.

Table 3. Estimated costs for CPP-603A basins removal action.

Project Tasks	Cost Estimate (× $1,000)	Net Present Value (× $1,000)
Basin water removal to ICDF evaporation pond	509	495
Basin grouting with rapid water removal	613	595
Project management and support	504	490
Surveillance and maintenance costs	1,000	656
Total:	2,626	2,236

The cost estimate does not include the cost of the earthen cap, because it is not a direct cost to this interim action.
ICDF = INEEL CERCLA Disposal Facility

The DOE-ID is responsible for removal action costs and the funds are available to implement the action. The project cost estimate is available in the Administrative Record for this action.

7. EXPECTED CHANGE SHOULD ACTION BE DELAYED OR NOT TAKEN

The expected change to the CPP-603A basins, should action be delayed or no action taken, would be that the basins would remain as they are today. Because the basins would continue to age, the potential that water and sludge will be released to the subsurface will increase with time. In addition, workers will accumulate radiological dose from maintaining and inspecting the basins.

8. STATUTORY AND REGULATORY AUTHORITY

The proposed removal action is being undertaken by the DOE-ID, as lead agency, pursuant to CERCLA Section 104 (a) and the *Federal Facility Agreement and Consent Order for the Idaho National Engineering Laboratory* (DOE-ID 1991). In accordance with 40 CFR 300.415(j) and DOE guidance, on-Site removal actions conducted under CERCLA are required to meet ARARs to the extent practicable considering the exigencies of the situation. The DOE-ID will comply with the ARARs and "to-be-considered" guidance as set forth in Section 5.

9. OUTSTANDING POLICY ISSUES

There are no outstanding policy issues.

10. ENFORCEMENT

The DOE-ID is conducting this removal action as the lead agency under the authority of 40 CFR 300.5, "Definitions," and 40 CFR 300.415 (b)(1), "Removal Action."

11. RECOMMENDATION

This Action Memorandum serves as a decision document and was developed in accordance with CERCLA and is consistent with the "National Oil and Hazardous Substances Pollution Contingency Plan" (40 CFR 300). Conditions at this site meet the 40 CFR 300.415(b)(2) criteria for a removal action.

The recommended action is to perform interim stabilization of the basins. The sludge in the basins will be removed and treated in accordance with HWMA/RCRA. This non-time critical removal action

includes removing basin water, treating and disposing of the basin water, removing a highly radioactive object (SHADO 1), and filling the basins with grout. Basin water will be removed while the basins are filled with grout. Debris objects contaminated with radioactive cobalt will be consolidated and encapsulated in the grout. The position of the debris objects will be noted for future location and removal, if necessary. The grout will provide shielding for the radioactive contamination embedded in the basin walls, eliminating possible migration and airborne contamination. The water will be pumped to the ICDF evaporation pond and evaporated. The final decontamination and disposal of the basin structure will be completed when the entire CPP-603 Complex is taken out of service. This interim action does not prejudice the final end-state alternative.

12. REFERENCES

40 CFR 61.92, 2004, "Standard," *Code of Federal Regulations*, Office of the Federal Register, August 2004.

40 CFR 61.93, 2004, "Emission Monitoring and Test Procedures," *Code of Federal Regulations*, Office of the Federal Register, August 2004.

40 CFR 61.94, 2004, "Compliance and Reporting," *Code of Federal Regulations*, Office of the Federal Register, August 2004.

40 CFR 61.145, 2004, "Standard for Demolition and Renovation," *Code of Federal Regulations*, Office of the Federal Register, August 2004.

40 CFR 61.154, 2004, "Standard for Active Waste Disposal Sites," *Code of Federal Regulations*, Office of the Federal Register, August 2004.

40 CFR 262, 2004, "Standards Applicable to Generators of Hazardous Waste," *Code of Federal Regulations*, Office of the Federal Register, April 2004.

40 CFR 262.11, 2004, "Hazardous Waste Determination," *Code of Federal Regulations*, Office of the Federal Register, October 2004.

40 CFR 268.40, 2004, "Applicability of Treatment Standards," *Code of Federal Regulations*, Office of the Federal Register, November 2004.

40 CFR 300, 2004, "National Oil and Hazardous Substances Pollution Contingency Plan," *Code of Federal Regulations*, Office of the Federal Register, November 2004.

40 CFR 300.5, 2004, "Definitions," *Code of Federal Regulations*, Office of the Federal Register, November 2004.

40 CFR 300.415, 2004, "Removal Action," *Code of Federal Regulations*, Office of the Federal Register, November 2004.

40 CFR 300.440, 2004, "Procedures for Planning and Implementing Off-Site Response Actions," *Code of Federal Regulations*, Office of the Federal Register, November 2004.

16 USC § 470 et seq., 1966, "National Historic Preservation Act," *United States Code,* October 15, 1966.

16 USC § 470aa–470mm, 1979, "Archaeological Resources Protection Act of 1979," *United States Code,* October 31, 1979.

42 USC § 9601 et seq., 1980, "Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA/Superfund)," *United States Code,* December 11, 1980.

DOE O 435.1, 2001, "Radioactive Waste Management," Change 1, U.S. Department of Energy, August 28, 2001.

DOE O 5400.5, 1993, "Radiation Protection of the Public and the Environment," Change 2, U.S. Department of Energy, January 7, 1993.

DOE-ID, 1991, *Federal Facility Agreement and Consent Order for the Idaho Engineering Laboratory*, Administrative Docket No. 1088-06-29-120, U.S. Department of Energy Idaho Field Office; U.S. Environmental Protection Agency, Region 10; Idaho Department of Health and Welfare, December 4, 1991.

DOE-ID, 1995, *Record of Decision Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs*, Document ID: 17033, Rev. 0, U.S. Department of Energy Idaho Operations Office, May 1995.

DOE-ID, 1999, *Final Record of Decision Idaho Nuclear Technology and Engineering Center, Operable Unit 3-13*, DOE/ID-10660, Rev. 0, U.S. Department of Energy Idaho Operations Office; U.S. Environmental Protection Agency, Region 10; Idaho Department of Environmental Quality, October 1999.

DOE-ID, 2002, *Idaho High-Level Waste & Facilities Disposition Final Environmental Impact Statement*, DOE/EIS-0287, Rev. 0, U.S. Department of Energy Idaho Operations Office, September 2002.

DOE-ID, 2004, *Engineering Evaluation/Cost Analysis for the CPP-603A Basin Non-Time Critical Removal Action, Idaho Nuclear Technology and Engineering Center*, DOE/NE-ID-11140, Rev. 0, U.S. Department of Energy Idaho Operations Office, August 2004.

EDF-3535, 2003, "CPP-603 Basins—Fissile Material in Particulate Form based on ^{137}Cs to ^{235}U Ratio," Rev. 0, Idaho National Engineering and Environmental Laboratory, August 2003.

EDF-3684, 2003, "Acceptable Residual Inventory Calculations for CPP-603," Rev. 0, Idaho National Engineering and Environmental Laboratory, May 2003.

EDF-4235, 2004, "CPP-603 Radionuclide Sample Results," Rev. 1, Idaho Completion Project, March 2004.

EDF-4271, 2004, "Quantification of Three Debris Objects from the South Basin of CPP-603 Using the Underwater Gamma Spectrometer System (TUGS)," Rev. 1, Idaho Completion Project, June 2004.

EPA, 1999, Memorandum, "Region 10 Final Policy on the Use of Institutional Controls at Federal Facilities," U.S. Environmental Protection Agency, Region 10, Office of Environmental Cleanup, May 3, 1999.

Idaho Code § 39-4401 et seq., 1983, "Hazardous Waste Management Act of 1983," State of Idaho, Boise, Idaho.

IDAPA 58.01.01.161, 1995, "Toxic Substances," Idaho Administrative Procedures Act, Idaho Department of Environmental Quality, June 1995.

IDAPA 58.01.01.585, 1995, "Toxic Air Pollutants Non-Carcinogenic Increments," Idaho Administrative Procedures Act, Idaho Department of Environmental Quality, June 1995.

IDAPA 58.01.01.586, 1995, "Toxic Air Pollutants Carcinogenic Increments," Idaho Administrative Procedures Act, Idaho Department of Environmental Quality, June 1995.

IDAPA 58.01.01.650, 1994, "Rules for Control of Fugitive Dust," Idaho Administrative Procedures Act, Idaho Department of Environmental Quality, May 1994.

IDAPA 58.01.01.651, 1994, "General Rules," Idaho Administrative Procedures Act, Idaho Department of Environmental Quality, May 1994.

IDAPA 58.01.05, 1993, "Rules and Standards for Hazardous Waste," Idaho Administrative Procedures Act, Idaho Department of Environmental Quality, March 1993.

IDAPA 58.01.05.006, 2004, "Standards Applicable to Generators of Hazardous Waste," Idaho Administrative Procedures Act, Idaho Department of Environmental Quality, March 2004.

IDAPA 58.01.05.011, 2004, "Land Disposal Restrictions," Idaho Administrative Procedures Act, Idaho Department of Environmental Quality, March 2004.

IDAPA 58.01.11, 1997, "Ground Water Quality Rule," Idaho Administrative Procedures Act, Idaho Department of Environmental Quality, March 1997.

INEEL, 2000, *HWMA/RCRA Less Than 90-day Generator Closure Report for the VES-SFE-126*, INEEL/EXT-2000-00582, Rev. 0, Idaho National Engineering and Environmental Laboratory, May 2000.

Public Law 99-499, 1986, "Superfund Amendments and Reauthorization Act of 1986 (SARA)," 100 Statutes 1728, *Public Law*, October 17, 1986.

Appendix A

Responses to Public Comments on CPP-603A Basins Removal Action

Appendix A

Responses to Public Comments on CPP-603A Basins Removal Action

Comment No.	Comment/Issue	Resolution
1.	We believe that Alternative 3 to remove the basin water to the ICDF evaporation ponds, to remove and grout the sludge for disposal in a low level waste facility, to remove the one highly radioactive debris item (SHADO), and to grout the remaining debris and the basin floor and walls in place without further cleaning, would adequately protect the aquifer and human health. We note that some of the sludge was previously removed, grouted, and disposed of as low-level waste about 25 years ago. For perspective in this situation it should be remembered that for several decades contaminated water was pumped directly to the aquifer at the rate of about 100 Ci per year. Significant migration of the radioactivity occurred for only a few miles, as has been shown by an intensive sampling program of several dozen down flow wells, conducted by the US Geological Survey. This was even true for tritium, the most mobile and most abundant radioactive contaminant. At least one well 3 miles down-flow from INTEC at the CFA can still be used for drinking water. By contrast, the fuel basins represent a smaller source of radioactivity, and this radioactivity must first be leached from between the concrete walls and floor and an adhering layer of grout before it can begin migrating to the aquifer.	Thank you for your comment, DOE agrees.

Comment No.	Comment/Issue	Resolution
2.	DOE might consider whether it would be less expensive to fill most of the basins with soil, while confining the grout to a layer a half meter thick adjacent to the walls and floor.	Soil and sand have been considered and were not evaluated further because of their porosity. The function of the grout is to replace the volume of the water as it is pumped to the ICDF. Soil or sand would entrap water in the interstitial spaces between particles. In addition, the extensive surface area of each of the soil/sand particles would become contaminated by exposure to the water and add to the radiation fields being controlled.
3.	After reviewing the documentation, the Shoshone-Bannock Tribes feels that complete removal of all the debris that has been identified in the Draft needs to be accomplished.	When activities in the CPP-603 Complex end, a final decision on the end state of the Complex will be made at that time. If it is determined at that time that removal of the debris objects is required, removal can be accomplished since the exact location of the objects will have been recorded and their radioactivity will have decayed to less dangerous levels.
4.	One other concern that hasn't been addressed is the removal of the water and how it will affect the sludge if exposed.	The sludge will be removed, stabilized, and disposed of before water is removed from the basins.
5.	If the alternative is to remove all of the debris then a concern we have is for the safety of the workers when the attempt to remove all of the water and the addition of the grout may allow some of the contamination to become airborne.	The sludge and SHADO 1 will be removed before water is removed from the basins. The current water level will be maintained to shield the basin walls and floor, contaminated scum line, rubbish, and debris objects remaining in the basins by continuously replacing the water being removed with equal volumes of grout.
6.	Additionally, the tribes believe that for the assurance of detection of contamination below and around the 603 basin building that sampling of the soil around the failed drain line and below the building be accomplished.	Sampling the soil around the failed drain line and below the building will be accomplished but not within the scope covered by this document. The soil around the failed drain line will be addressed under an existing RCRA closure action and soil below the building will be evaluated as part of existing WAG 3 CERCLA actions.
7.	In addition, if the alternative is to grout the basin the Tribes feel that it needs to addressed later that a compete removal of the basin in the future would need to be accomplished and not left in place.	The implementation of the action described in this document would not prohibit complete removal of the basin in the future if total removal is consistent with the final end state identified for the CPP-603 Complex when the CPP-603 Complex is no longer needed.

Comment No.	Comment/Issue	Resolution
8.	The INEEL CAB recommends that DOE select the alternative that would result in removal from the basin: • All sludge • The SHADO-1 • All Uranium-235 contamination • All water.	The proposed action accomplishes the four listed removals.
9.	In addition, the INEEL CAB recommends that the alternative selected for this Interim Removal Action not prejudice the choice of end state. In the case of the residual cobalt, this requirement could be satisfied by (a) removal of all cobalt-60-contaminated objects, or (b) sequestration and localization of such objects so that they may be safely relocated and removed if the chosen end state so requires.	Implementation of the proposed action, Alternative 3, will not prejudice the choice of end state. Sequestration and localization of the cobalt-60 containing objects so that they may be safely relocated and removed if the chosen end state so requires will be accomplished by this activity.
10.	Finally, the INEEL CAB recommends that DOE conduct soil sampling around the failed drain line as soon as the removal action has been completed, rather than waiting until 2035**.**	The DOE will conduct soil sampling around the failed drain line (3 ½"PLA-100115) as committed to in the *HWMA/RCRA Less Than 90-day Generator Closure Report for the VES-SFE-126* (INEEL 2003). When the water is removed from the basins and the threat to the integrity of the basin is mitigated, a characterization plan specifying methods for determining the nature and extent of contamination will be developed and implemented.
INEEL CAB Questions Regarding the Engineering Evaluation/Cost Analysis for the CPP-603A Basin		
11.	The risk assessment [page 18] assumes that the grout will completely contain radioactive objects for 500 years. Is this a valid assumption? What data is being used to back this up?	The 500-year integrity of the grout is a valid assumption and is consistent with the modeling assumptions used in the *Idaho High-Level Waste & Facilities Disposition Final Environmental Impact Statement* (DOE-ID 2002). The risk assessment, using analytical data presented in the referenced EDFs, for the CPP-603A basins provides a benchmark for the purposes of comparison. The risk assessment demonstrates that leaving ALL of the source term in the grouted basins would not result in an unacceptable risk.

Comment No.	Comment/Issue	Resolution
12.	Table 1 [pages 10-11] provides an inventory of radioactive nuclides in the sludge and water at the present time and after 500 years of radioactive decay. What is the radioactive inventory 30 years in the future when the entire CPP-603A/B complex is planned to be demolished?	As discussed under No. 1 above, the majority of the radioactivity inventory will be removed from the basin when the sludge and water are removed. The debris objects—contaminated primarily with cobalt-60, with a 5.27-year half-life—will have decayed to 19.5 Ci. There is radioactive contamination embedded in the porous cement walls and floor of the basins that will be shielded by the grout used to displace the basin water.
13.	Alternative 3 leaves in place 13 discrete objects [page 13] contaminated by cobalt-60. What will be the level of radioactivity of these objects 30 years in the future when the entire CPP-603 A/B complex is planned to be demolished?	The primary radioactive constituents in the debris objects are described in EDF-4271 (2004) as cesium-137 (Cs^{137}) and cobalt-60 (Co^{60}). The Cs^{137} (approximately 16.29 Ci) is associated with SHADO 1 and will be removed and disposed of off-Site. The remaining contaminant is Co^{60} (approximately 1,283 Ci based on 2003 and 2004 scanning) and is found in the remaining discrete debris objects that will be left in the basins. The Co^{60} has a radioactive half-life of 5.27 years and will decay to 19.5 Ci. The final end state for the CPP-603 Complex will be determined at the end of fuel operations in the Irradiated Fuel Storage Facility. The end state identified may reflect removal of all remaining contamination from the CPP-603 Complex.
14.	The cost analysis in Table 14 [page 48] presents a question. Option 3 is the least complex, Option 4 is more complex, and Option 5 is the most complex; this is reflected by the increasing costs for the Options. Why is the project management cost for Option 4 ($717K) is higher than for either of the other Options ($487K)?	The project management time period calculated for Option 4 is approximately 6 months longer than Option 3 because of the additional time required to remove and manage the debris objects.

Comment No.	Comment/Issue	Resolution
15.	Alternatives 3 and 4 assume that contaminated water, sludge and debris will meet the acceptance criteria of the ICDF. Is this a good assumption? What data is available to back up this assumption? If the ICDF will not accept some or all of the waste products, what other alternatives are there?	This was a good assumption since the basin water currently meets the ICDF's waste acceptance criteria. If the character of the water changes as a result of removal activities in the basins, filtration and treatment capabilities will be provided in the transfer stream from CPP-603 to the ICDF. Sludge dewatering and treatment will be handled in accordance with the Idaho Hazardous Waste Management Act. After the sludge has been treated to meet land disposal restrictions, it will be disposed of in an appropriate landfill that can accept radioactive waste. The debris objects will not be disposed of at the ICDF.
16.	The EE/CA states [page 54] that the grouted basins are above the 100-year floodplain. However they are only 12 inches above the floodplain. What would happen if the grouted basins were exposed to a flood in the next 500 years?	Until spent fuel storage activities end in the CPP-603 Complex, the grouted basins will remain within the CPP-603 building. At the end of the operational life of the building, a decision on the final end state of the CPP-603 Complex will be made. A flood prior to implementation of the final end state would only impact the basins for a short period of time and would not be expected to compromise the integrity of the grout.
17.	What process was used to characterize the contents of the basin and how sure is DOE that the characterization is complete and accurate? Has the debris been fully characterized according to generally accepted scientific standards?	The process implemented to characterize the contents of the basins and the results are described in detail in EDF-3535, EDF-3684, EDF-4235, and EDF-4271, which are available in the Administrative Record. The EDFs receive a thorough peer review for accuracy. The debris has been fully characterized according to generally accepted standards. The four EDFs describe a process that included radiological scanning of the basin floor and sampling and analysis of the material found on the bottom of the basins.

Comment No.	Comment/Issue	Resolution
18.	What criteria and process will be used to determine whether debris should be left in place or removed?	The criteria used will be evaluation of the worker exposure to remove the debris objects and the environmental benefit derived from the exposure in addition to an analysis of the cost to remove debris objects. The environmental benefit of removing the debris is relatively small compared to the worker exposure and cost because of the short half-life (5.27 years) of the primary contaminant, Co^{60}.
19.	For the debris remaining in place, is there good evidence that the radioactivity remaining will decay essentially to background (in my trade, that's ten half-lives) before the grout begins to disintegrate?	The Citizens' Advisory Board Committee asked for clarification of the term "debris," as used in the EE/CA for the proposed CPP-603A basin non-time critical removal action. The EE/CA uses the term "debris" to refer to both radioactive and nonradioactive particulate material in the basins. The terms "debris" and "debris object" are used in the document to refer to 14 discrete, highly radioactive objects sitting on the basin floor as well as a variety of nonradioactive hand tools, material inadvertently dropped in the basins over the years, and general rubbish that has fallen into the basins. This terminology has resulted in confusion regarding the amount of uranium-235 that will remain in the basins if each of the analyzed alternatives is selected. Much of the detailed information about the CPP-603 basins is currently found in EDFs that are referenced in the EE/CA and are available in the Administrative Record. The following is a summary of information in those files. If Alternative 1—*No Action*—is selected, 13.983 kg of uranium-235 will remain in the basins. This is a conservative value calculated by adding the 3.8 kg of uranium-235 estimated to be in the larger particulate component in the sludge, the 10.18 kg of uranium-235 estimated to be in the finer particulate in the basin sludge, and the 3 g of uranium-235 estimated to be in the small high-activity debris object, which is called SHADO 1. The other objects called debris in the document are nondetect for uranium or nonradioactive rubbish.

Comment No.	Comment/Issue	Resolution
		If Alternative 2—*Removal and Disposal of Water with Sludge and Debris Grouted in Place*—is selected, 13.98 kg of uranium-235 will remain. The sludge and debris would remain in the basin, but the SHADO 1 debris object would be removed. This lowers the estimated remaining uranium-235 by 3 g. If Alternative 3—*Removal and Disposal of Water and Sludge with Grouting of Debris in Place*—is selected, the uranium-235 identified in the three EDFs will be removed from the CPP-603A basins (the SHADO 1 debris object and the uranium-235 containing sludge and debris). The 13 discrete debris objects other than SHADO 1 will stay in the basin. The miscellaneous nonradioactive rubbish will remain in the basins. As stated above, these debris objects do not have detectable amounts of uranium-235. These objects are the nonradioactive material inadvertently dropped in the basins over the years and the stainless steel that was activated by being exposed to high levels of radiation in reactors. As a set, these objects contain approximately 1,283 Ci of cobalt-60 based on 2003 and 2004 scanning. Cobalt-60 has a half-life of 5.27 years. The CPP-603B spent nuclear fuel management operations are expected to continue until 2035. By that time, the radioactive cobalt will decay to levels that are comparable to the radiation expected to be emitted by radioactive contamination embedded in the basin walls. If Alternative 4—*Removal and Disposal of Water, Sludge, and Debris with Basins Grouted in Place*—is selected, no detectable uranium-235 should remain in the basin. As with Alternative 3, all uranium-235 containing sludge, debris, and debris objects will be removed.

Comment No.	Comment/Issue	Resolution
		If Alternative 5—*Water, Sludge, and Debris Removal and Disposal with Basin Interior Cleaning, Followed by Fixative and Shielding Installation*—is selected, no uranium-235 should remain in the basin. The cleaning may remove some fraction of the contamination assumed to be embedded in the walls and floor, but the ratio of near-surface contamination to deeply embedded contamination cannot be estimated with our current knowledge. If Alternative 6—*Water, Sludge, Debris, and Basin Floor and Wall Removal and Disposal*— is selected, no uranium-235 will remain. As stated in the EE/CA, Alternatives 1, 2, and 6 will not be selected. Alternative 1 will not remove the risk of water release to the aquifer. Alternative 2 does not comply with state statutes. Alternative 6 is not possible at this time. Complete removal of the basins cannot be accomplished until CPP-603B spent nuclear fuel management work is completed. Alternatives 3, 4, and 5 do not differ with respect to final uranium-235 inventory. The sludge removal equipment will be designed to remove all sludge and uranium-235 containing debris in a manner that will protect workers from radiological exposure.
20.	What proportion of the ICDF would the sludge from the CPP 603 basin fill? (What proportion of the radioactivity allowed would be filled by the contents as it includes Uranium 235?)	If the sludge were disposed of in the ICDF, the 0.03 Ci of U^{235} to be removed from the basins would consume an estimated 0.04% of the ICDF landfill's waste acceptance criteria mass of 83 Ci U^{235}. The estimated 90 750-gal high-integrity containers (335 yd^3 total) generated by sludge treatment for disposal would consume approximately 0.07% of the total of 510,000-yd^3 ICDF capacity. At this time, however, a disposal facility has not been selected for the sludge.

Comment No.	Comment/Issue	Resolution
21.	Has sand been considered instead of grout? If not, why not?	Sand has been considered and was not evaluated further because of its porosity. The function of the grout is to replace the volume of the water as it is pumped to the ICDF. Sand would entrap water in the interstitial spaces between particles. In addition, the extensive surface area of each of the sand particles would become contaminated by exposure to the water and add to the radiation fields being controlled.
22.	What is planned for the water that will come out of the basin? Will it be filtered before being disposed in the ICDF?	The basin water currently meets the ICDF's waste acceptance criteria. If the character of the water changes as a result of removal activities in the basins, filtration and treatment capabilities will be provided in the transfer stream from CPP-603 to the ICDF.
23.	Where did the Uranium 235 come from?	It is the result of nearly 50 years of underwater-spent nuclear fuel storage, corrosion, and fuel cutting activities.
24.	How will the decision to leave or remove debris fit with the overall strategy for putting the rest of the complex into an acceptable end state?	As described above, the debris will decay to a level that will not prohibit implementation of whatever end state is ultimately selected for the CPP-603 Complex.
Clarification of the term "Debris" as used in the CPP-603A Basin Engineering Evaluation and Cost Analysis		
25.	This text was submitted to the CAB to provide additional information regarding the use of the term "debris" in the Draft EE/CA.	Please see the response to Number 19.

CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act
CPP = Chemical Processing Plant
DOE = U.S. Department of Energy
DOE-ID = U.S. Department of Energy Idaho Operations Office
EDF = engineering design file
EE/CA = engineering evaluation/cost analysis
ICDF = INEEL CERCLA Disposal Facility
INEEL = Idaho National Engineering and Environmental Laboratory
RCRA = Resource Conservation and Recovery Act
SHADO = small high-activity debris object
WAG = waste area group